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April 22, 2015

Mary Kauffman
Caribou-Targhee National Forest
1405 Hollipark Dr.
Idaho Falls, Idaho 83401

Subject: Biological Selenium Removal Treatment Technology
Fluidized Bed Bioreactor Pilot Study
March 2015 Progress Report

Dear Mary,

This progress report describes operation and monitoring activities for March 2015 associated with the fluidized bed bioreactor pilot study located near Hoopes Spring. This pilot study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring. Operation and monitoring of the pilot study follows the *Pilot Study Work Plan and Sampling and Analysis Plan (SAP), Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor* (prepared by Formation Environmental, dated September 2014, with revised text and tables dated March 5, 2015).

The following activities took place in March 2015:

- Start-up activities were completed by Frontier Water Systems (Frontier) in mid-March, and operation of the pilot study plant has been conducted jointly by Simplot and Frontier. Simplot has been performing the monitoring required under the SAP, and Frontier has been troubleshooting the system to achieve steady-state conditions.
- No disruptions to treatment occurred between the completion of the plant start up (March 18) and the end of the reporting period covered by this report (March 31).
- The initial steady state flow sampling event occurred on 3/18/2015 (corresponding to week 0 from the SAP). The first operational sampling event occurred on 3/31/2015 (week 2). Samples from both events were analyzed for the full analyte suite. See Table 1.1 and Table 1.2 for results.
- In-line water quality meters are present in the system for pH, temperature, and dissolved oxygen. Table 2 presents water quality parameters recorded from the in-line meters.

Identification of Deliverables and Data Transmittals

Revised text and tables for the *Pilot Study Work Plan and Sampling and Analysis Plan, Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor* were submitted to the Agencies on March 5, 2015.

Attached in Table 1.1 and 1.2 are preliminary laboratory analytical results (received through April 3) for samples collected on March 18 and March 31, 2015, respectively. Also attached in Table 2 are provisional field data for the treatment system samples collected through March 31, 2015.

Upcoming Activities

The following activities associated with the fluidized bed bioreactor pilot study at Hoopes Springs are scheduled through mid-May 2015:

- In early April the system was temporarily shut down. Flow through the sand filter was impeded resulting in elevated water levels in the clarification tank. Additional details regarding the shutdown and subsequent maintenance will be addressed in the April monthly report.

- At the time of this report, the system is still offline for maintenance. An addendum to the work plan is being drafted to address sampling activities when the system is restarted. It is anticipated that the system will be back online in time for the second quarterly sampling event.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

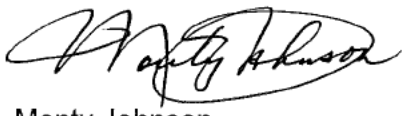

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Table 1.1
Analytical Results: Week 0

Biological Selenium Removal Treatment Technology
Fluidized Bed Bioreactor

		Station >>	Influent	Bioreactor Effluent	Effluent
		Sample ID >>	SC0315-LSSHS-IN001	SC0315-LSSHS-BE001	SC0315-LSSHS-EF001
		Date >>	3/18/2015	3/18/2015	3/18/2015
Analyte	**Units**	**Design Basis**			
General Chemistry					
Ammonia as N	mg/L		0.03 U	0.03 U	0.03 U
Nitrate as N	mg/L		0.315	0.05 U	0.05 U
Nitrate/Nitrite as N	mg/L		0.339	0.05 U	0.05 U
Total Alkalinity	mg/L as CaCO3		190	186	190
Bicarbonate	mg/L as CaCO3		190	186	190
Carbonate	mg/L as CaCO3		1 U	1 U	1 U
Hardness	mg/L		244	246	242
Biochemical Oxygen Demand	mg/L	10	2 U	20	3.1
Chemical Oxygen Demand	mg/L		5 U	15.7	16.4
Calcium, Dissolved	mg/L		60.7	60.9	60
Magnesium, Dissolved	mg/L		22.5	22.8	22.5
Potassium, Dissolved	mg/L		0.779	0.788	0.776
Sodium, Dissolved	mg/L		7.5	7.53	7.42
Chloride	mg/L		9.57	8.85	9.76
Fluoride	mg/L		0.357	1.73	0.365
Phosphorus	mg/L		0.01 U	0.174	0.188
Sulfate as SO4	mg/L		56.7	54.3	56.5
Total Organic Carbon	mg/L		1 U	9.07	3.63
Total Diss. Solids	mg/L		289	293	288
Total Susp. Solids	mg/L	10	5 U	5 U	5 U
Metals and Metalloids					
Aluminum, Dissolved	mg/L		0.036 U	0.036 U	0.036 U
Aluminum, Total	mg/L		0.036 U	0.036 U	0.036 U
Antimony, Dissolved	mg/L		0.00044 J	0.00019 U	0.00019 U
Antimony, Total	mg/L		0.00049 J	0.00019 J	0.00019 U
Arsenic, Dissolved	mg/L		0.00052 J	0.00015 J	0.00016 J
Arsenic, Total	mg/L		0.00055 J	0.00014 J	0.00015 J
Barium, Dissolved	mg/L		0.0491	0.0494	0.0483
Barium, Total	mg/L		0.0484	0.0457	0.0464
Beryllium, Dissolved	mg/L		0.000048 U	0.000048 U	0.000048 U
Beryllium, Total	mg/L		0.000048 U	0.000048 U	0.000048 U
Boron, Dissolved	mg/L		0.0148 J	0.0192 J	0.0186 J
Boron, Total	mg/L		0.0148 J	0.0194 J	0.0187 J
Cadmium, Dissolved	mg/L		0.000072 U	0.000072 U	0.000072 U
Cadmium, Total	mg/L		0.000072 U	0.000072 U	0.000072 U
Chromium, Dissolved	mg/L		0.00049 J	0.0004 U	0.0004 U
Chromium, Total	mg/L		0.0004 U	0.0004 U	0.0004 U
Cobalt, Dissolved	mg/L		0.00013 J	0.00014 J	0.00038 J
Cobalt, Total	mg/L		0.00011 J	0.00012 J	0.00011 J
Copper, Dissolved	mg/L		0.00015 U	0.00019 J	0.00015 U
Copper, Total	mg/L		0.00015 U	0.00015 U	0.00015 U
Iron, Dissolved	mg/L		0.026 U	0.026 U	0.026 U
Iron, Total	mg/L		0.0347 J	0.0275 J	0.0422 J
Lead, Dissolved	mg/L		0.000031 U	0.000031 U	0.000031 U
Lead, Total	mg/L		0.00012 J	0.000031 U	0.000031 U
Manganese, Dissolved	mg/L		0.0009 J	0.0015	0.0021
Manganese, Total	mg/L		0.0011	0.0015	0.0021
Mercury, Dissolved	mg/L		0.00004 U	0.00004 U	0.00004 U
Mercury, Total	mg/L		0.00004 U	0.00004 U	0.00004 U
Molybdenum, Dissolved	mg/L		0.0026	0.0028	0.0027
Molybdenum, Total	mg/L		0.0026	0.0027	0.0027
Nickel, Dissolved	mg/L		0.0025	0.0024	0.0028
Nickel, Total	mg/L		0.0021	0.0019	0.0022
Selenium, Dissolved	mg/L		0.112	0.002 J	0.0049
Selenium, Total	mg/L	0.005	0.126	0.0069	0.0108
Silver, Dissolved	mg/L		0.000021 U	0.000021 U	0.000021 U
Silver, Total	mg/L		0.000021 U	0.000021 U	0.000021 U
Thallium, Dissolved	mg/L		0.000031 J	0.000026 U	0.000026 U
Thallium, Total	mg/L		0.000026 U	0.000026 U	0.000026 U
Uranium, Dissolved	mg/L		0.0016	0.00031 J	0.00033 J
Uranium, Total	mg/L		0.0015	0.00031 J	0.00029 J
Vanadium, Dissolved	mg/L		0.0018	0.00087 U	0.00087 U
Vanadium, Total	mg/L		0.0015	0.00087 U	0.00087 U
Zinc, Dissolved	mg/L		0.0061	0.001 U	0.001 U
Zinc, Total	mg/L		0.0103	0.0015 J	0.0012 J

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 1.2
Analytical Results: Week 2

		Station >>	Influent	Effluent
		Sample ID >>	SC0315-LSSHS-IN002	SC0315-LSSHS-EF002
		Date >>	3/31/2015	3/31/2015
Analyte	**Units**	**Design Basis**		
Nitrate as N	mg/L		0.006 J	0.006 U
Selenium, Dissolved	mg/L		0.125	0.00362
Selenium, Total	mg/L	0.005	0.12	0.00316

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 2.0
Field Water Quality Data

Week 0		Station >>	Influent	Bioreactor	Effluent
		Sample ID >>	SC0315-LSSHS-IN001	SC0315-LSSHS-BE001	SC0315-LSSHS-EF001
		Date >>	3/18/2015	3/18/2015	3/18/2015
Analyte	**Units**	**Design Basis**			
Dissolved Oxygen	mg/L	≥6	**5.96**	**0.02**	8.01
ORP	mV		23.9	-99.2	36.6
pH	SU	6.5 - 9	7.61	7	7.71
Specific Conductance	umhos/cm		503.2	504.1	498.9
Temperature	C	9 - 12	**12.03**	11.97	**12.02**
Turbidity	NTU	2	1.15	1.73	**2.94**

Week 2		Station >>	Influent	Effluent
		Sample ID >>	SC0315-LSSHS-IN002	SC0315-LSSHS-EF002
		Date >>	3/31/2015	3/31/2015
Analyte	**Units**	**Design Basis**		
Dissolved Oxygen	mg/L	≥6	6	**5.74**
ORP	mV		234.2	28.7
pH	SU	6.5 - 9	7.42	7.02
Specific Conductance	uS/cm3		5.04	496
Temperature	C	9 - 12	**12.3**	11.66